The Technological Block

The technological block will have the following facilities: (1) weighing, crushing, grinding, and sampling plant, and fine-grinding equipment; shatter test apparatus for coke; abrasion test apparatus for coke; screens; a room for the storage of samples for reference; (2) general stores; precision instrument shop; (3) general workshops; (4) room for electrical power distribution; (5) semi-technical carbonization ovens; (6) small gasification, hydrogenation and artificial oxidation plant; (7) boiler and pulverized fuel firing equipment; (8) vibrator screens for screen analysis on large-scale samples; and (9) small foundry.

Space is provided for boiler and other plant which may be required, for example, coke ovens, producer gas units, hydrogen generators, low-temperature carbonization plant, tar-hydrogenation plant, refineries, gas holders, Fischer–Tropsch units, and coal-washing plant.

A railway siding will be available for the technological block and the above plants in due course. Meanwhile, permission has been obtained to use the nearby railway siding of the Tata Iron and Steel Co.

Coal Survey Laboratories

To take stock of the basic supplies of fuel in India is but plain sense. Fuels provide the raw materials for heating and power generation and for numerous chemical industries, which in a planned economy require a degree of co-ordination. Fuels are essential to industries producing dyes, explosives, drugs, plastics, disinfectants and antiseptics; coal tars are of prime importance in highway construction; while in the manufacture of lime and cement, of bricks and refractories, of iron and steel, fuels are indispensable. Add to this that they provide usually the main source of power for all industries—generally through the medium of steam-raising plant—and their fundamental importance is unquestionable. Fuels, however, are a wasting or diminishing asset in contrast to water-power. Consequently reserves become of great significance. In India reserves of good coking coal are disconcertingly low, according to present statistics, reserves of iron ore of excellent quality being far in excess of the known available supplies of coal suitable for the manufacture of the requisite metallurgical coke. A policy of conservation for such coals may have to be adopted.

It is thus necessary at the outset to make a survey of the types of coal and the amounts available, and it is proposed to establish, as in Great Britain, coal survey laboratories in the major coalfields, staffed and equipped for the sampling and testing of fuels. Standard methods will be adopted wherever practicable. It is not the intention, however, to confine the functions of these laboratories to the assessment of resources, qualitative and quantitative. They will be encouraged to help in the numerous problems which arise in industry, whether fuel-producing or fuel-consuming. Moreover, should national policy so decide, these stations may also serve in the control of distribution and utilization of fuel. Meanwhile, their main function is the physical and chemical survey of the fuels available. Needless to say, in this work the Fuel Research Institute will co-operate closely with the Geological Survey and the Mines Department. The coal survey for the Jharia Coalfield will form part of the work of the Institute. The officers of the various survey stations will be trained at the Institute, and close liaison maintained between them and headquarters by such means as half-yearly conferences.

Staffing and Expenditure

The technical, administrative and artisan staff at the Institute will number between 100 and 200. The administrative staff will be of the order of 20–30; the technical staff will have 15–20 senior officers with 40–50 juniors, and an equal number of laboratory assistants and mechanics. Adequate unskilled labour has also been allowed for. Each of the field survey stations will carry a staff consisting of one or two senior officers, with 5–10 juniors, and a proportionate number of assistants for office and laboratory work. In some cases, unusually heavy charges have had to be anticipated for accommodation, transport, apparatus and chemicals, especially if the stations are remote from towns.

The annual expenditure of the Fuel Research Institute will be of the order of £100,000, excluding the expenditure on the field survey stations, which will vary with their number, but is expected to be of the order of £5,000 each. The capital cost of the central Institute and of the survey stations is of the same order as the annual expenditure, say £120,000 for the main Institute and £7,000 for a survey station.

The foundation stone of the Fuel Research Institute was laid by the Hon. Mr. C. H. Bhabha, Minister for Works, Mines and Power in the Interim National Government, on November 17, 1946.

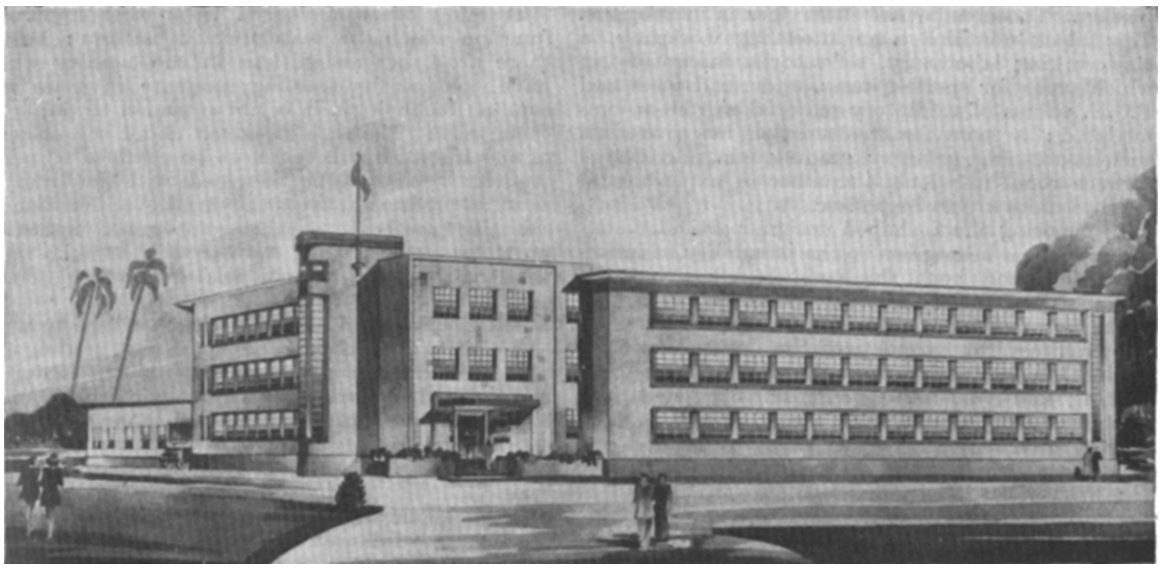
CENTRAL GLASS AND CERAMIC RESEARCH INSTITUTE, INDIA

By Y. P. VARSHNEY

Acting Officer-in-Charge, Central Glass and Ceramics Institute

THERE are few fields of industrial development in which scientific investigation has played, during the last twenty-five or thirty years, such a decisive part as in the glass and ceramic industries. Whereas in these industries spectacular developments have taken place in the industrially advanced countries of Europe and in America, conditions in India have remained comparatively static, although under the stress of war there has been some expansion.

Attention was directed to the unsatisfactory condition of the Indian glass industry and to the need for an Institute for training and research in glass technology by the Indian Industrial Commission so early as 1918, and this was further stressed in the report of the Indian Tariff Board on the glass industry in 1932. It was considered that the industry in India could not be expected to make satisfactory progress or make much headway without the aid of properly organised technological institutions, although the industry enjoys numerous advantages such as availability of raw materials, labour and a ready market within the country. The need for research was never felt so keenly both by the Government and the industry as during the War, when large and immediate supplies of glass and ceramic goods were required, and the Indian industry was hard put to meet the



ARCHITECT'S DRAWING OF THE CENTRAL GLASS AND CERAMIC RESEARCH INSTITUTE, INDIA

demand in respect of quantity and quality, as well as of variety. It was to fulfil this urgent need and to create an organisation for helping the glass and ceramic industries in the application of scientific methods that the Government of India, through the Council of Scientific and Industrial Research, decided to establish the Central Glass and Ceramic Research Institute.

The preliminary details for its establishment were worked out by a committee under the chairmanship of Sir S. S. Bhatnagar. A report embodying its proposals was submitted by the committee to the governing body of the Council in August 1944, and on the basis of its recommendations the Council decided (*a*) that the Institute be located at Calcutta, which is an important centre of glass and ceramic industries in India, and which offers many other advantages for the work and growth of an institution of this nature, and (*b*) that a sum of twelve lacs of rupees be provided for the capital expenditure of the Institute.

Site and Buildings

The site selected for the Institute is in one of the southern suburbs of Calcutta in comparatively quiet and open surroundings. It measures approximately 650 ft. × 440 ft., the shorter side on the west giving the road frontage; it is nearly seven acres in area. The major part of this plot is expected to be taken up by the Institute buildings, but a small portion may be utilized for building residential quarters for some of the senior staff, if this is considered necessary at a later stage.

The buildings of the Institute have been designed in an L-shaped plan and will consist of two sections, namely, a main building which is ultimately intended to be a three-storeyed structure, although only two storeys may be built at present; and the technological block, which is single-storeyed and has, for the greater part, a north-light roof.

Such a division was considered desirable in order that laboratories for precision work, library, museum, offices, etc., could be located in the main building, while furnaces, workshop, machines for raw material treatment, etc., and large testing units, the operation of which is of necessity attended by considerable vibrations and noise, could be placed in the technological block. However, these two sections, though distinct, are to be close together and connected so as not to hamper in any way the progress of co-ordinated operations being simultaneously carried out in both of them.

The main building, with a floor area of about 17,500 sq. ft. on each floor, will form the shorter arm of the L-design about 230 ft. long facing the roadway, as also the first 145 ft. of the longer arm which extends to a total length of nearly 325 ft. The remaining 180 ft. length of the longer arm is occupied by the technological block, which has a covered floor area of about 16,000 sq. ft. The main entrance will be on the outside of the corner of the L, facing the roadway.

On the ground floor of the main building, three spacious museum rooms will form the major part of the frontage. By the side of these will be a drawing office and blue-print room; while facing them across a central corridor which runs the whole length of the L will be the physical and physico-chemical laboratories, in which spectroscopic, spectrophotometric, X-ray and other equipment for the study of physical properties will be housed. Other rooms on the same floor will include a room for optical testing and instruments, electrical laboratories, laboratory for enamelling and decorative work, a constant-temperature room and a dark room for photographic and spectrographic work. On the first floor, directly above the museum rooms, will be the conference room, library and the lecture hall; there will be sitting-rooms for officers above the main entrance. Facing the library and lecture hall across the corridor will be the chemical laboratories, and in the other wing on this floor there will be a room for petrographic and microscopic work, and also three rooms for office, records and statistics.

The construction of the technological block was started in September 1945 and is now nearing com-

pletion. The installation of services is in progress. This block contains a maintenance workshop, a clay-working laboratory, refractories laboratory in which units for spalling tests, underload tests and P.C.E. values of refractory material will be accommodated; a room for treatment of raw materials such as crushing, grinding, grading, etc., and a large furnace room in which a number of experimental furnace units are to be housed.

In choosing the L-shaped design, particular consideration has been given to the possibility of future expansion, and both the main building and the technological block are capable of considerable expansion independently without detracting from the architectural harmony of the entire structure. Besides, due attention has been given to adequate lighting and ventilation, ease of movement and communication inside the building, as well as suitability to local weather conditions. It is proposed that the main building shall be air-conditioned.

In view of the developments in fittings and devices used in laboratory services and of the great importance of such services in a laboratory, much attention is being given to this feature. Besides an adequate water supply, the Institute laboratories will have town gas supply, A.C. and D.C. electric supply and service lines for compressed air and vacuum according to requirements.

Functions

The functions of institutions concerned with technological subjects are objective in character, namely, the improvement and development of the particular industry or industries with which they are connected. This forms the chief objective of the Institute, and in keeping with it greater emphasis will be laid on industrial research and development of glass and ceramic processes. However, it is to be borne in mind that fundamental research has also to be promoted and encouraged, as without advancement in fundamental knowledge, no new industrial work of importance will be possible. Thus the Institute will aim at fundamental research having a bearing on different branches of glass and ceramics.

To attain its objective of helping the growth and development of the glass and ceramic industries, the Institute must engage in activities of a diverse character. In a country like India, where the number of technically trained persons engaged in industries is very small, and knowledge about many of the methods of manufacture followed nowadays abroad is either completely lacking or scanty, an institution which can give technical assistance to the industry can serve a very useful purpose. To give such technical assistance will, therefore, be one of the immediate functions of the Institute. This will be directed largely towards improvement of the existing technique of manufacture followed in Indian factories, as well as helping in the adoption of manufacturing processes which have so far not been undertaken in India. Such technical assistance is expected to be largely confined to the early stages, until the progress of these industries encourages the growth of independent consulting technologists and agencies; and as these grow, the Institute will curtail this aspect of its activities. To promote the above aim, the Institute will also undertake the collection of data and dissemination of information by means of publications, discussions, lectures and visits of technical personnel to industrial works.

Training of technologists is another important function which the Institute will perform; but as there are other institutions in the country which have courses for training students in glass and ceramic technology, it is not intended to duplicate their work. The training given under the auspices of the Institute will therefore be confined to a few students who will be provided with facilities to acquire practical experience in the application of scientific methods to the solution of industrial problems, so that they may be able to take independent charge of technological duties in glass and ceramic factories.

Another function of the Institute will be to serve as a central organisation for the testing, grading and standardization of glass and ceramic raw materials and finished articles. This will include calibration of appliances and control instruments. As yet, there is no organisation in the country to carry out work of this nature. The Indian glass and ceramic industries have no specifications for raw materials or finished goods; and it is difficult to expect that specifications followed abroad can be strictly applied to present-day Indian conditions. It is felt that certain standards suitable to Indian conditions should be laid down, and the Institute will help in formulating them and revising them from time to time as the industry progresses.

In the majority of investigations undertaken at the Institute, it is expected that laboratory-scale experiments will suffice; but as the translation of laboratory results into commercial operations often involves aspects not covered by laboratory work, the Institute will carry out investigations on a pilot-plant scale. In this work it is expected that assistance from industrial concerns situated in Calcutta will be readily available.

To fulfil its purpose, it is scarcely necessary to stress the importance of the Institute maintaining the closest relations with the industries in India. Also, being a central organisation engaged in glass and ceramic technological work, it will keep in contact with similar organisations abroad.

Staff

The wide and exacting functions of the Institute demand that the directing staff, apart from possessing high scientific abilities, should be able to inspire a spirit of team-work and create an enthusiasm for it, and the Council is fully alive to these requirements. Although ultimately the Institute will have separate sections for glass, porcelain, enamels and refractories, during the period of organisation it will function largely on a composite basis; and it is rather early to say, at this stage, what will be the full complement of technical or other staff; but it is hoped that in the final stages the senior technical staff of the Institute will consist of a director in charge of the Institute with two assistant directors and three research officers specialized in different branches. To assist them there will be five junior research officers and a number of research assistants and research students. In the appointment of the staff, care will be taken to ensure that all branches of glass and ceramic technology are well represented, so that investigations on all aspects can be successfully conducted by those qualified for the work.

The foundation stone of the Central Glass and Ceramic Research Institute was laid by the Hon. Sir Ardeshir Dalal, Member for Planning and Development, Viceroy's Executive Council, on December 24, 1945.